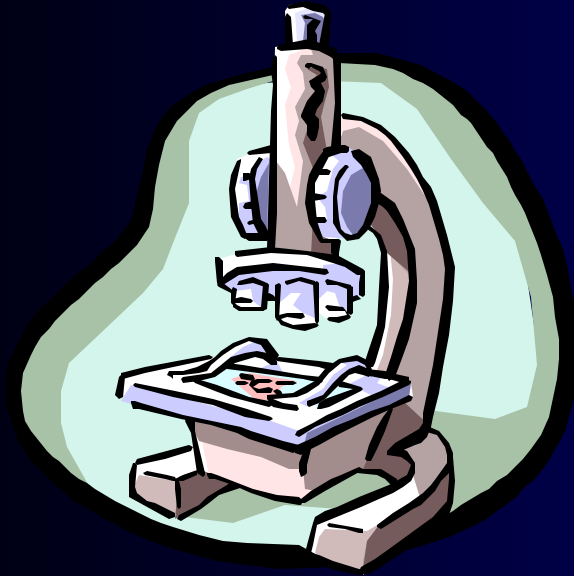


Work In Progress: Proposed LEED Rating System for Laboratories



Energy 2002
June 2002

Victor Neuman, PE
Director

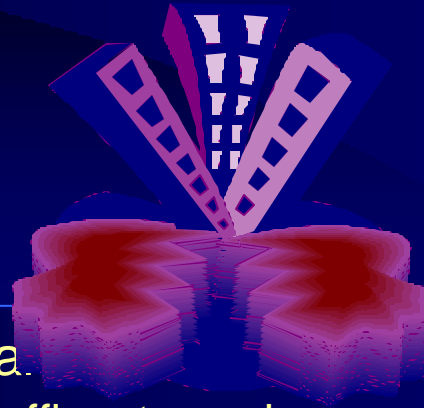
**Tek-Air Systems,
Inc.**

LEED for Labs



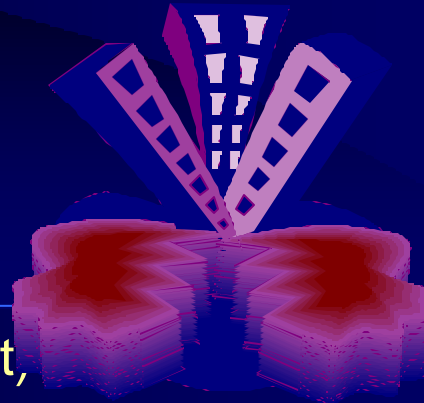
- Maintain all the progress achieved under LEED 2.0
- Address Laboratory specific issues for air and water pollution as well as solid waste, hazardous chemical and radioactive waste, and specialty energy and safety issues.
- Provide weighting factors to make LEED for Labs as challenging and as environmentally beneficial as present Silver-Gold-Platinum standard.

Sustainable Sites



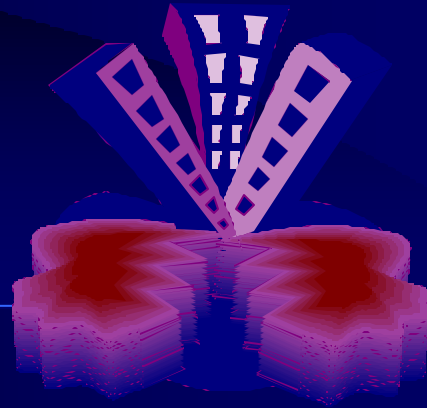
- Site Credit 9: Safety & Risk Management
 - Intent: To Minimize the building effluents, and environmental, safety and health impact to site and neighbors
- Requirements:
- Transportation of Chemicals (1 point)
 - Evaluate the impact of chemical delivery and storage when selecting the site and placing the building on the site.

Sustainable Sites



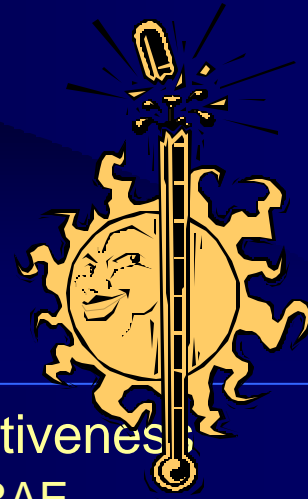
- Air Effluent Dispersion (1 point)
 - Meet or Exceed ACGIH TWA, STEL, or ANSI Z9.5 standards for instantaneous exposure limits for hazardous chemicals and equivalent standards for biological and radioactive hazards
- Water Effluent Dispersion (1 point)
 - Prevent release of hazardous chemicals to municipal treatment facilities or the environment.

Sustainable Sites



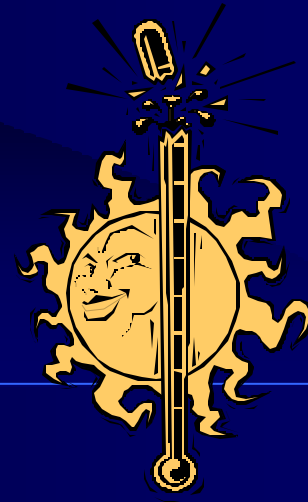
- Technologies/Strategies:
- Transportation
 - Develop a plan to minimize the potential or accidental exposure of the surrounding human and biological community to hazards.
- Air Distribution:
 - Physical or mathematical modeling of air pollution
- Water:
 - Setup wastewater monitoring program and install wastewater holding tanks.

Indoor Envir. Quality



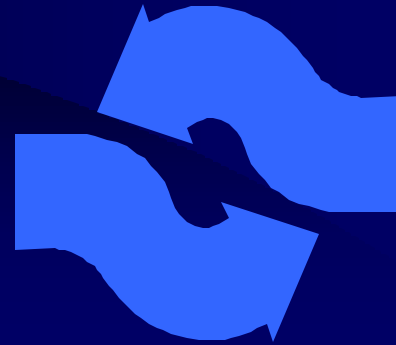
- Credit 2: Increase Ventilation Effectiveness:
 - Based on ANSI Z9.5 instead of ASHRAE.
- Optimize Indoor Airflow with CFD Modeling (1 point)
- Conduct Robust Fume Hood Testing (1 point)
- Incorporate Hazard Specific Air Monitoring (1 point)
- No Windows or Doors Open to Outside Air (1 point)
- Low standby, High Purging Exhaust (1 point)

Indoor Envir. Quality



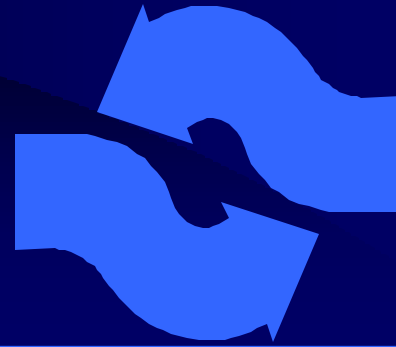
- Technologies/Strategies:
- Fume Hood Locations
- Small Control Zones
- Locations of Supply Air Diffusers/Cross-drafts
- Separation of Lab from non-Lab Spaces

Water Efficiency



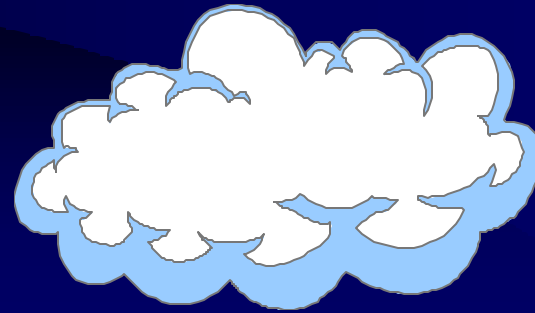
- Prerequisite: Do not use domestic water for equipment cooling.
- Credit 4: Process Water Efficiency (applied to labs)
 - Reduce or eliminate the use and generation of process water on-site

Water Efficiency



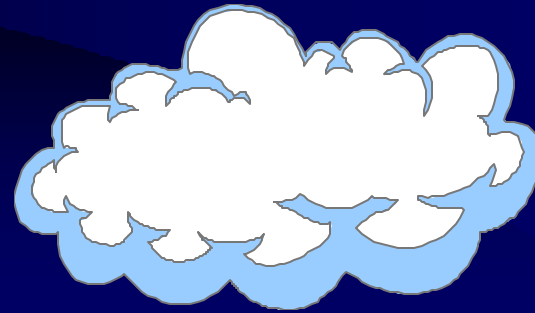
- Requirements: Employ technologies based on the Pollution Prevention Hierarchy.
 - Eliminate, Reduce, Recycle, Treat
- Reduce the Use of Process Water or the Generation of Process Wastewater by:
 - 30% - (1 point)
 - 40% - (2 points)
 - Install meters to measure usage and submit reports.

Energy & Atmosphere



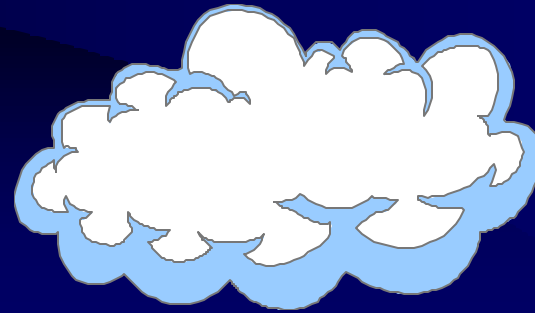
- ***Prerequisites:***
- Automated lab room pressure control (IAQ)
- Fume hood monitors and alarm (IAQ)

Energy & Atmosphere



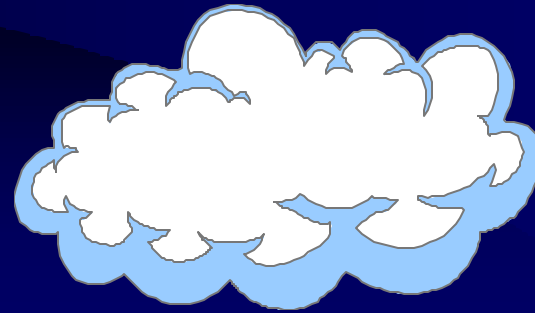
- *Intent: Implement Best Practice*
- **Requirements:**
- **High performance Fume Hoods (2 points)**
- **VAV hoods (1 point)**
 - *Advanced technology/high performance hoods (hoods at no greater than 50 cfm psf of work surface area) (2 points)*

Energy & Atmosphere



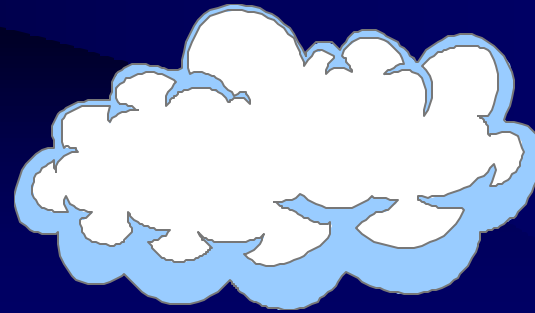
- ***Energy (Heat Recovery) (1 point)***
 - *Minimum 50% recovery*
- **No Simultaneous Heating and Cooling (1 point)**
 - *Provide heating and cooling coils in each zone*

Energy & Atmosphere



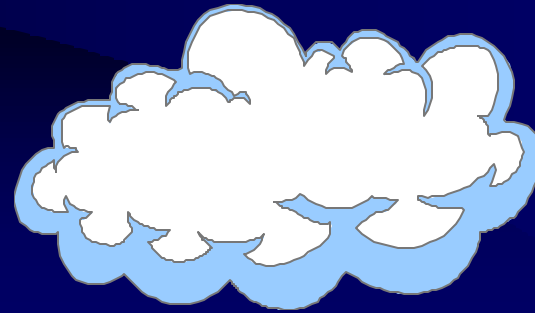
- ***Evaporative Cooling (1 point)***
 - ***May be direct or indirect. At least 75% of the outside supply air shall be cooled to 85 degrees or below, using evaporative techniques (direct, indirect, and/or tower side economizer).***

Energy & Atmosphere



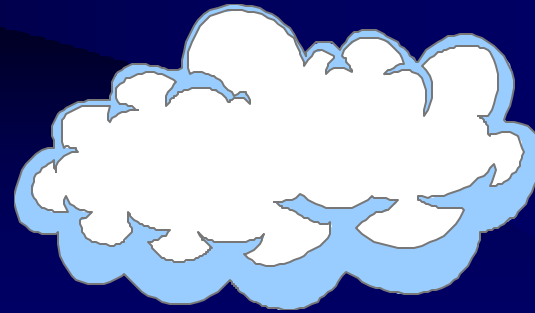
- ***Minimize occupied outside air (1 point)***
 - *Have outside airflow below 1 cfm/sf, or clearly justify if greater.*
- ***Reduce airflow during unoccupied periods (1 point)***
 - *Be able to reduce overall outside airflow a minimum of 40% during unoccupied periods.*

Energy & Atmosphere



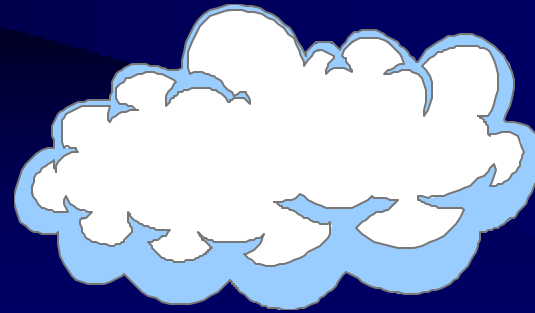
- **Expand temperature dead band during unoccupied periods (1 point)**
 - *Provide capability to reset zone temperature set points based on occupancy.*
- **Encourage small zones of control (1 point)**
 - *No HVAC zone greater than 1000 sf.*

Energy & Atmosphere



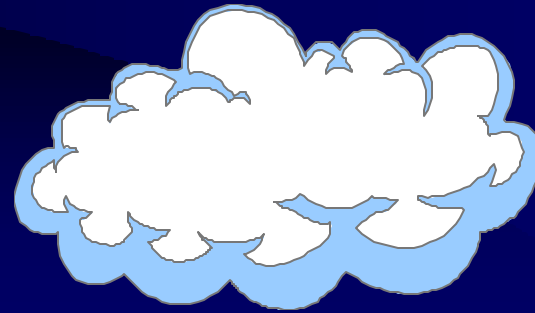
- **Multi-temperature cooling system (1 point)**
 - *Provide at least two parallel cooling loops with separate chillers operating at least 15 degrees temperature difference.*
- **Provide High Part Load Heating & Cooling Efficiency (1 point)**
 - *Maintain a minimum of 90% peak efficiency at 20% peak load.*

Energy & Atmosphere



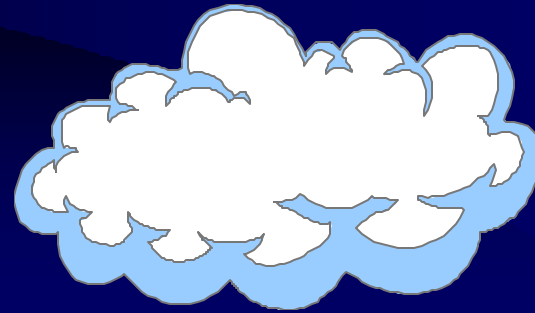
- **Design for Optimum Air Flow Distribution**
 - *0.5 watts/cfm peak - include supply air, return air, and exhaust air (1 point)*
 - *0.3 watts/cfm peak (2 points)*
- **Technologies/Strategies**
 - *Generously size ducts, low pressure drop components, high efficiency fans and motors.*

Energy & Atmosphere



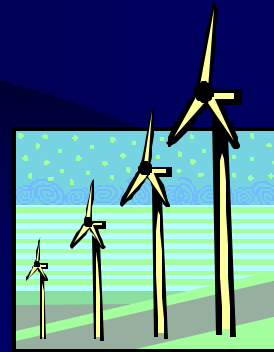
- **Increased Monitoring (1 point)**
 - *Automate conversion of meter data to provide performance benchmarks for lighting, ventilation, process/plug, cooling and heating to be available in real time as well as historically by hour, day, month, and year.*
 - *Use this data for design feedback and to train operating and maintenance staff.*

Energy & Atmosphere



- **Increase overall energy efficiency (1 point)**
 - *Install clean combined heat and power system. CHP to provide at least 40% of the thermal energy for heating and cooling with no emission of NOX > 9 ppm.*

Energy & Atmosphere



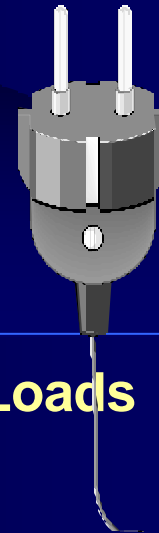
- **Increase use of Renewable Energy**
 - *1% of Site Energy from Renewables (1 point)*
 - *2% (2 points)*
 - *4% (3 points)*

Energy & Atmosphere



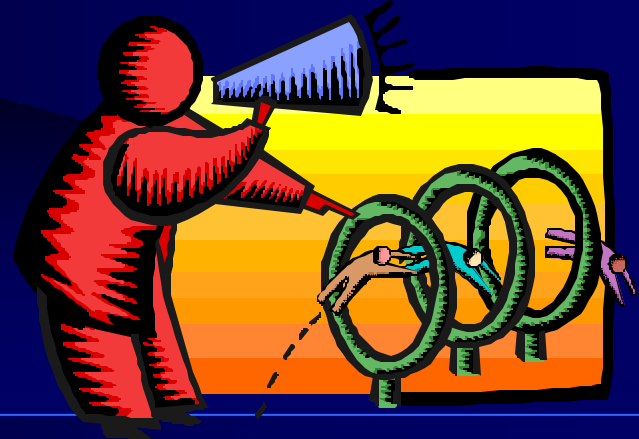
- **Increase office equipment energy efficiency (1 point)**
 - *Utilize Energy Star equipment for 90% of new equipment and 40% of all office equipment*

Energy & Atmosphere



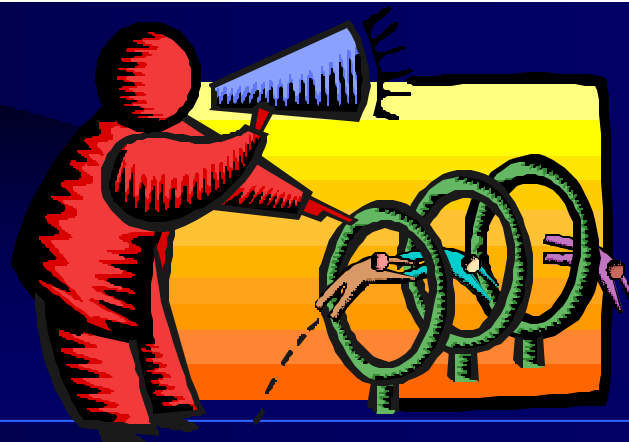
- **Avoid Oversizing Electrical Plug Loads (1 point)**
 - *Measure base usage of equipment electrical loads for similar labs and design electrical & cooling systems based on these measurements.*
 - *Provide measurements and calculations in documentation.*

Materials & Resources



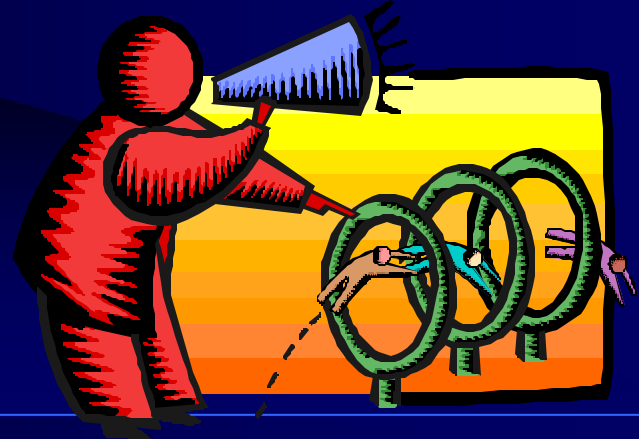
- Credit 1 Building Reuse
 - Change intent for labs so that usefulness of laboratory building is extended and construction of replacement laboratory buildings is minimized.
- For laboratory buildings where re-use of non-laboratory buildings as labs is not recommended-
 - Design Lab for deconstruction & re-use (1 point)
 - Adaptable, Modular Lab Building (1 point)
 - Full Interstitial Space (1 point)

Materials & Resources



- Chemical Resource Management
 - Intent: Manage lab chemicals to limit quantities, improve distribution, limit storage space, and reduce waste.
- Technologies/Strategies:
 - Just-in Time Contracting
 - Closed Loop Contracting
 - Chemical Exchange
 - Substitute Less Toxic Materials In Experiments

Materials & Resources



- Possible Innovation Credits
 - Air Cascading
 - Use data from monitoring for staff feedback
 - Encourage Mini-Environments
 - Portable Equipment Recommendations
 - Integrated Design Approach
 - Set performance Targets
 - Design Charettes
 - Goals for Team Members

LEED for Labs

Recommendations for Next Steps



- Work with the USGBC to incorporate new credits for labs in LEED version 3.0
- Offer a subset of these credits as alternatives for current credits for Lab LEED certification under LEED 2.0

LEED for Labs

Credit Alternatives in Version 2.0

- **Sustaining sites** – none
- **Water efficiency**
 - --New prerequisite – Do not use domestic water for equipment cooling
- **Energy and Atmosphere**
 - -- Credit 1 Optimize energy performance (strengthen definition of base case for labs)
 - -- Credit 2 Renewable Energy (substitute the LEED for Lab alternative definition (3 points))

LEED for Labs

Credit Alternatives in Version 2.0

(cont.)

- **Materials and Resources**
 - Credit 1 Building Reuse – substitute the Lab Alternative credit for 3 points
- **Indoor Environmental Quality**
 - Credit 2- Ventilation Effectiveness – substitute the Labs Alternative definition for 1 point
 - Credit 4 – Low emitting materials – For labs, also require that the low VOC materials must scrub well

LEED for Labs

Credit Alternatives in Version 2.0

(cont.)

- **Design Process and Innovation**
 - allow any of the proposed LEED for Lab 3.0 credits to qualify as innovation points